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| EXAMINER |
|---|
| TANG, KENNETH |

| ART UNIT | PAPER NUMBER |
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DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on _08 July 2005_.
2a) ☐ This action is **FINAL**.       2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
     closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) _1-57_ is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1-57_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
     a) ☐ All   b) ☐ Some * c) ☐ None of:
        1. ☐ Certified copies of the priority documents have been received.
        2. ☐ Certified copies of the priority documents have been received in Application No. _____.
        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
           application from the International Bureau (PCT Rule 17.2(a)).
     * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
     Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1.      This application is in response to the Amendment filed on 7/8/05.  Applicant's arguments

have been fully considered but were not found to be persuasive.

2.      Claims 1-57 are presented for examination.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
> any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
> requirements of this title.

3.      Claims 15-28 are directed to method steps which can be practiced mentally in

conjunction with pen and paper, therefore they are directed to non-statutory subject matter.

Specifically, as claimed, it is uncertain what performs each of the claimed method steps because

it is not tangible.  The examiner suggests applicant to change "method" to "computer

implemented methods" in the preamble to overcome the outstanding 35 U.S.C. 101 rejection.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

Claima 1-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention:

a.    In claim 1, "that thread" (lines 13 and 23) is indefinite because it is not made

explicitly clear in the claim language which thread from "each thread" (line 8) this refers

to.

b.    Claims 15, 29, 43, and 57 are rejected for the same indefinite reasons as in claim

1.


### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.  Patentability shall not be negatived by the manner in which the invention was made.

**1.    Claims 1-5, 7-9, 11-19, 21-23, 25-33, 35-37, 39-47, 49-51, and 53-57 are rejected**

**under 35 U.S.C. 103(a) as being unpatentable over Blelloch et al. (hereinafter Blelloch) (US**

**6,434,590 B1) in view of Kawachiya et al. (hereinafter Kawachiya) (US 2001/0025295 A1).**


2.    As to claim 1, Blelloch teaches a computer system that employs a plurality of threads of

execution to perform a parallel-execution operation in which the threads identify tasks

dynamically and in which the computer system comprises:

A) a separate status-word field (status buffers SB1) with each of the threads *(col. 5, lines*

*22-35)*; and

B) a mechanism that operates the threads in a manner that *(col. 5, lines 19-47)*:

i) each thread executes a task-finding routine to find tasks previously identified

dynamically and performs tasks thereby found, with its status-word field containing a

value indicating it is active (live tasks), until the task-finding routine finds no more tasks

*(col. 12, lines 3-15, col. 13, lines 47-65)*;

ii) when the task-finding routine executed in step (i) finds no more tasks, that

thread sets the contents of its status-word field a value indicating it is inactive (updates

the status buffer SB1 and flag) *(col. 5, lines 19-48, col. 6, lines 44-67 through col. 7, lines

1-36)*;

iii) after completing step (ii) and while the status-word field (flag) associated with

any other thread contains a value indicating that the other thread is active, that thread

continues to search for a task using the ask-finding routine, and, if it finds one, sets

(updates) its status-word field contents to a value indicating that it is active before

attempting to execute a found task *(col. 5, lines 19-48, col. 6, lines 44-67 through col. 7,

lines 1-36)*; and

iv) during step (iii) when none of the status-word fields contains an activity-

indicating value that an associated thread is active and no task has been found, that thread

terminates (operation ends) its performance of the parallel-execution operation *(col. 5,

lines 40-52)*.

3.      Blelloch teaches using a buffer manager BM1 to manage the various status buffers SB1

(contains the status-word field) *(col. 5, lines 22-35)* but fails to explicitly teach using a

mechanism (global status word) that associates with the separate status-word field of the threads.

However, Kawachiya teaches a parallel processing garbage collection system that uses global

reference objects of states/status associated and substituted with other objects of states/status *(page 2, [0020])*. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the feature of using a global status word that associates with the separate status-word field of the threads because this would increase the control of the system by allowing the thread to detect the occurrence of a condition whereby the state of object should be changed *(page 2, [0020])*.

4.      As to claim 2, Kawachiya teaches a computer system wherein the parallel-execution operation is a garbage-collection operation *(page 1, [0014])*.

5.   ·  As to claim 3, Blelloch teaches a computer system as defined in claim 1 wherein:
A) each thread has associated with it a respective work queue in which it places task identifiers of tasks that thread identifies dynamically; B) the task-finding routine executed by that thread includes performing an initial search for a task identifiers in the work queue associated with that thread and, if that work queue contains no task identifiers that thread can claim, thereafter performing a further search for a task identifier in at least one other task-storage location *(col. 5, lines 19-52, col. 12, lines 3-15, col. 13, lines 47-65)*.

6.   ·  As to claim 4, Kawachiya teaches a computer system wherein the parallel-execution operation is a garbage-collection operation *(page 1, [0014])*.

7.      As to claim 5, Blelloch teaches a computer system wherein the at least one other task-

storage location includes at least one work queue associated with a thread other than the

executing thread *(col. 5, lines 19-52)*


8.      As to claim 7, Blelloch in view of Kawachiya  fails to explicitly teach wherein the task-

finding routine includes selecting in a random manner the at least one work queue associated

with a thread other than the executing thread.  However, "Official Notice" is taken that both the

concept and advantages of providing that selecting in a random manner at least one work queue

associated with a thread other than the executing thread is well known and expected in the art.  It

would have been obvious to one of ordinary skill in the art at the time the invention was made to

include selecting in a random manner at least one work queue associated with a thread other than

the executing thread to the existing system in order to ensure an unbiased selection.


9.      As to claim 8, Blelloch teaches wherein the further search includes repeatedly searching a

work queue associated with a thread other than the executing thread until the executing thread

thereby finds a task or has performed a number of repetitions equal to a repetition limit greater

than one *(col. 5, lines 19-52)*.


10.     As to claim 9, it is rejected for the same reasons as stated in the rejection of claim 7.

11.     As to claim 11, Blelloch teaches wherein the contents of all of the status word fits in a

memory location accessible in a single machine instruction (every action requires a single time

step to be executed) *(col. 11, lines 12-15)*.


12.     As to claim 12, Blelloch teaches a computer system wherein the parallel-execution

operation is a garbage-collection operation *(page 1, [0014])*.


13.     As to claim 13, Blelloch teaches wherein each status-word field is a single-bit field (flag)

*(col. 6, lines 44-67)*.


14.     As to claim 14, Blelloch teaches wherein the activity-indicating value is a logic one and

the inactivity-indicating value is a logic zero (flag) *(col. 6, lines 44-67)*.


15.     As to claims 15-19 and 21-23, they are rejected for the same reasons as stated in the

rejection of claims 1-9.


16.     As to claims 25-28, they are rejected for the same reasons as stated in the rejection of

claims 11-14.


17.     As to claims 29-33, they are rejected for the same reasons as stated in the rejection of

claims 1-5.

18.     As to claims 35-37, they are rejected for the same reasons as stated in the rejection of

claims 7-9.


19.     As to claims 39-42, they are rejected for the same reasons as stated in the rejection of

claims 11-14.


20.     As to claims 43-47 and 49-51, they are rejected for the same reasons as stated in the

rejection of claims 1-9.


21.     As to claims 53-56, they are rejected for the same reasons as stated in the rejection of

claims 11-14.


22.     As to claim 57, it is rejected for the same reasons as stated in the rejection of claim 1.


### Allowable Subject Matter

23.     Claims 6, 10, 20, 24, 34, 38, 48, and 52 would be allowable if rewritten to overcome the

rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all

of the limitations of the base claim and any intervening claims.


### Response to Arguments

24.    During patent examination, the pending claims must be "given their broadest reasonable

interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d

1664, 1667 (Fed. Cir. 2000). Applicant always has the opportunity to amend the claims during

prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once

issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05,

162 USPQ 541, 550-51 (CCPA 1969).

25.    *Applicant argues on pages 15-16 of the Remarks that Blelloch does not disclose that the threads themselves find and execute tasks.*

In response, the Examiner respectfully disagrees. Applicant acknowledges that Blelloch

teaches a thread processing system wherein threads are grouped in to tasks. The broadest

reasonable interpretation of a thread is a computer instruction. And in the cited portion of

Blelloch *(col. 5, lines 23-53)*, it is disclosed that program instructions (threads) are used to

determine which tasks to execute.

26.    *Applicant argues on page 16 of the Remarks that the task queue and buffers manager is not the thread that executed a task finding and performed found. In addition, there is no indication that the task queue and buffers manager is the same as the aforementioned scheduler.*

In response, the thread is the computer program instruction that are used to determine

which tasks to execute *(col. 5, lines 23-53)*. In response to applicant's argument that the

references fail to show certain features of applicant's invention, it is noted that the features upon

which applicant relies (i.e., scheduler) are not recited in the rejected claim(s). Although the

claims are interpreted in light of the specification, limitations from the specification are not read

into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Even

so, Blelloch teaches scheduling using a scheduler *(col. 5, lines 23-53)*.


*27.     Applicant argues on page 17 of the Remarks that Blelloch does not teach that each thread examines the status-word fields and terminates based on its own examination.*

In response, the Examiner respectfully disagrees. The broadest reasonable interpretation

of a status-word field in light of the specification (page 4, lines 7-11) is merely a field that

indicates activity. Blelloch teaches the use of flags to indicate activity/inactivity *(col. 6, lines 44-*

*67 through col. 7, lines 1-36)*. The flag serves as an end-of-program marker and based on how

the flag is set, termination occurs (operation ends) *(col. 5, lines 23-52, col. 6, lines 44-67 through*

*col. 7, lines 1-36)*.



### *Conclusion*

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Kenneth Tang whose telephone number is (571) 272-3772. The

examiner can normally be reached on 8:30AM - 6:00PM, Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

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Art Unit: 2195

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

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system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kt
7/22/05

MAJID BANANKHAH
PRIMARY EXAMINER